

ADVANCED
PROJECTS

Master media streaming

Do you prefer watching films from the comfort of your sofa, rather than at your PC? Jon Bray outlines what's required to stream a range of media files from a PC to your TV

In the past decade there has been a dramatic shift in the way we consume music and radio. Sales of CDs have plummeted as downloads have taken over, iPods have outsold MiniDisc players and radio stations are available not just on FM, MW, LW and SW frequencies but on the internet, DAB and even satellite and cable TV transmissions.

We're beginning to see something similar with video, as more movies and TV become available online. Major TV channels have download services, including the BBC's fantastic iPlayer and Channel 4's 4oD, so you can watch the TV you want in your own time. There's a vast repository of quality clips and movie trailers on Apple's website and sites like YouTube. Home movies are now almost exclusively edited and stored on the home PC, along with photographs.

As the media we watch and listen to shifts away from the home entertainment system to the PC, we risk sidelining the expensive LCD TV that cost hundreds of pounds. The same goes for the hi-fi. We're quite sure that you'd rather spend your free time on the sofa instead of sitting in front of your PC watching missed episodes of *Gardener's World*. You'd probably rather listen to your collection of Mahler's symphonies in that comfy IKEA armchair rather than perched uncomfortably in the study.

Media streaming lets you bring digital content into your living area, so you don't have to tie yourself to the PC. With a bit of work and perseverance, adding a simple media streamer will allow you to watch and listen to your digital media from the comfort of your sofa on your TV and hi-fi. Not only that, but get the setup right and you'll also be able to browse your entire media library, watch home movies, view photographs and even listen to internet radio using a single interface.

There are three basic building blocks you need to put together a media streaming system at home: a PC or laptop, a router and a media-streaming device.

A common scenario would use a PC or laptop to store all the video and music files you want to watch and listen to in your living room. It sends the music or video data via the router to the media streamer, which is connected to home entertainment devices such as a TV and hi-fi. The media streamer box then converts the information being streamed to it and plays it back on the device.

THE NETWORK

The trickiest thing about any media streaming system is getting the network set up right. The connection between your PC and the media streaming device is critical to successful streaming. Using a wireless network is the most convenient way to go, and most broadband services supply a wireless router for free these days – and they're cheap to buy. However, media streaming over wireless can be a tough trick; the further your media streaming box gets from your router, the less reliable the wireless connection.

This isn't usually an issue when simply browsing the web or streaming audio, but it could cause big problems when streaming large amounts of data. If you're only interested in streaming audio from internet radio stations, or music from your MP3 collection, then you need a stable connection running at only 1Mbit/s. You need a constant and fast network connection if you want smooth video playback. This means at least 4Mbit/s for standard definition footage. That may not sound much, especially when most wireless equipment manufacturers claim speeds of 54Mbit/s or more, but you may be surprised to discover how narrow the bandwidth on your home network actually is. Even if the router is in the same room as the wireless media streamer, network speeds could be peaking at a miserable 15Mbit/s or lower.

If you're not sure how fast your network is, you can carry out a rudimentary test. Place a laptop computer

INTRODUCTION

Media streaming lets you access your favourite digital content from the comfort of your living room, using standard home entertainment equipment. The content itself is usually stored on a PC, which can be left running in another room. Playing content over the network to a TV set is a fantastic way to view internet video, as you don't have to crowd around a PC screen. However, setting up a system that is easy to use and can handle every type of media you need is not always simple. We'll explain everything you need to know to get things up and running.

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The screenshot shows the Windows Media website with a search bar at the top. The main content area is titled 'WMV HD Content Showcase' and features a section for 'High Definition Quality with Windows Media Video 9'. Below this, there are three video thumbnails: 'Adrenaline Rush', 'Fighter Pilot', and 'Mystery of the Nile'. Each thumbnail includes a 'Get the DVD' button. The left sidebar contains links for 'For Home' (Windows Media Player, FAQ, Extras, Music & Video, Cool Devices) and 'For Professionals' (Enterprise & A/V Pros, Downloads, Help & Support, Community, Windows Family).

◀ Microsoft's website has numerous clips you can use to check that your network is up to scratch

BBC iPlayer ISPs hate it, we love it

With the launch of iPlayer at the end of last year, many BBC TV programmes are now available to watch online via the service (www.bbc.co.uk/iplayer). This is a fantastic system that allows you to catch up with programmes you missed without having to own a Freeview recorder. It's much better than rival services from the likes of Channel 4 and Sky, which limit the amount of available content much more, even charging for some.

Watching a streamed TV programme directly on the iPlayer website is the easiest way to get started, but you're restricted to watching content on your computer this way and you can only watch programmes up to seven days after they were first broadcast. It's also pretty low quality footage and you'll notice instantly that programmes look pretty

awful in full-screen mode. You're better off downloading the higher-quality DRM-limited WMV files using iPlayer's peer-to-peer service.

Once the files are downloaded you can keep them for 30 days and, once opened, you get another seven days in which to view the programme again.

The big disappointment right now is that you can't watch these files on your streaming device. We tried with several devices that support WMV-DRM files and found that either error messages appeared stating that the files weren't supported, or that the resulting video had a jerky frame rate and low resolution. It's also worth bearing in mind that, because of the DRM technology, you're limited to sharing the content through a Windows Media Player media streamer.



▲ The iPlayer allows you to download and watch BBC programmes up to 37 days after they were first broadcast

Essentially, if you were planning to download and stream iPlayer content, think again. The most convenient viewing method is to download the files to a laptop and connect it directly to your large-screen television for the best quality.

next to your TV and connect it to the wireless network. Download Net Meter from www.hootech.com/netmeter, install it on the source PC. Use its Stopwatch mode to monitor a single large file transfer (around 10MB) from the source machine (where videos and music are stored) to the laptop. Better still, go to the Windows Media WMV HD Content Showcase website (<http://tinyurl.com/oxf5o>), download one of the big HD files labelled as '1080p' to the source machine and try to stream it.

The speed test will provide you with a good idea of your network's capacity for video streaming. Bear in mind, though, that the wireless adaptor in your streamer will probably not be as good as the one in the laptop, so speeds will be somewhat lower. In our experience, if you knock off roughly 5Mbit/s from your result you'll be in the right area.

The latest wireless technology is 802.11n, although it is still at the draft stage. However, products with Draft-N certification are now in the shops, which means they should at least work with each other. Draft-N is faster and more stable at a given distance than 802.11g, with a theoretical maximum bandwidth of 248Mbit/s.

However, you can count the number of media streaming boxes that support Draft-N on the fingers of one hand. The only devices we're aware of that have it built in are the Linksys DMA2100 and DMA2200 Media Center Extender devices. For those to work properly you need to have Windows Media Center running on your source machine, with Draft-N router and a Draft-N adaptor too. It's an expensive approach and we'd advise you to wait until devices become widespread, and competition more intense, before you commit your cash. Alternatively, consider one of the options below.

WIRED FOR VIDEO

To stream video, your speed test result (above) should exceed 4Mbit/s or you have a problem, although it needn't be insurmountable. It simply means that you need to use a wired network.

The simplest and cheapest way of wiring up a media network is to run a length of network cable from a free port on your router to the Ethernet port on the back of your media streamer. This is fine if you keep the router and media streamer in the same room, or you're handy with a drill and hammer and

don't mind having wires running along your skirting boards.

For everyone else, there's powerline networking. This uses the mains cabling in your home to send and receive data. It's more expensive than a long network cable, but much more flexible and elegant. All you need to do is buy a pair of HomePlug devices such as the Solwise NET-PL-200AV-PIGGY (reviewed in *What's New, Shopper* 244, in which we also reviewed streaming media players). Plug one into a mains socket next to your router and one in a socket near the media streamer box. Hook them up to the Ethernet ports on each device.

The great advantage of this approach is that it's much simpler to set up than wireless; all you need to do is plug the things in and there's no configuration required. It's also much more reliable and faster over longer distances, plus it's cheaper than going for the full Draft-N setup.

There are three types of HomePlug devices that you can buy. Avoid the 14Mbit/s variety, which uses an old standard and probably won't be fast enough for your needs. Also avoid anything that isn't HomePlug certified. Non HomePlug-certified equipment won't work with equipment from other companies based on the same standard, so you won't be able to add further adaptors as and when you need. Instead, buy a pair of 85Mbit/s devices (from around £50 a pair) or 200Mbit/s (around £120 a pair).

HD OR NOT HD?

The above setup should give you enough bandwidth to stream standard-definition video, but what about HD? HD camcorders are coming down in price all the time and you can download HD movie trailers and video clips from a variety of different sources. There are plenty of media streamers on the market that claim to offer the capability, but do they work?

You could be forgiven for being sceptical, especially given the bandwidth requirements of Blu-ray, which is set at a maximum of 54Mbit/s, while most movies come in at around a steady 30 to 40Mbit/s. While this seems too much for a home network to handle, most HD video you can download or record as a home movie is of a much lower bit rate and can easily be streamed over a wired network.

If you're lucky, and your streamer has strong enough reception, you may even be able to watch HD video over a wireless connection.

We've persuaded standard Wireless G devices to stream 720p video perfectly smoothly, as well as 1080p with the aforementioned Draft-N Linksys DMA2200. However, these results were achieved in ideal conditions with the streamer and router in close proximity to each other, at opposite ends of a living room.

BUYING A MEDIA STREAMER

The first thing to consider before buying a media streamer is what content you want to use it with. If you don't want to stream video, you can buy one of the many audio-only media streamers around. The excellent Logitech Squeezebox and Sonos Digital Music System devices are good choices.

There are plenty of devices that offer not only internet radio but also the ability to play music from shared folders on your PC or laptop. The superb Pico Revo internet radio does this, and also offers DAB as well. As we've pointed out previously, audio streaming doesn't need high bandwidth so you can happily opt for wireless devices here.

For all-round video-capable media streaming, there are even more options. If you've gone for a wired network, you can get much better value. The Zyxel DMA 1000, for instance, does away with wireless altogether and is therefore able to offer more features for less cash. The Xbox 360 and PlayStation 3 games consoles both offer wired media streaming capabilities out of the box, and give you gaming, HD output and, in the case of the PS3, a Blu-ray drive as well.

If it has to be wireless, the first thing to look for is the ability to connect an external aerial. This gives you the option of extending the range of the device using a high-gain aerial. Dual



◀ Using powerline networking makes streaming standard-definition video and even HD much easier than with a wireless network



▲ Modern games consoles such as Sony's PlayStation 3 have surprisingly sophisticated streaming capabilities

aerials, such as those found on Netgear's EVA8000, will also help in the pursuit of faster, more stable wireless connections.

You should also look for a streamer that is able to access shared folders over the network or support standards-based UPnP media streaming server software. You'll want to avoid products such as the Linksys DMA-3300, which is tied to proprietary server-side software, as they limit you to one manufacturer's way of doing things and force you to keep your PC on all the time. This isn't a problem if your source machine is a Windows PC, but if you want to store media files on an old PC or laptop with Linux installed on it, or if you don't like the idea of leaving your PC switched on all the time and intend to use a network attached storage (NAS) device for storing all your media files, this type of streamer will be a problem.

UPnP makes the business of setting up your streamer on the network much easier. Instead of having to set up permissions and sharing for each folder you want to stream media from, you simply start your server software (which is built into some NAS devices) and specify what you want to share. It also gives you a wide choice of server software to choose from. Microsoft's Media Player 11 has a UPnP server built in. The program, formerly known as Windows Media Connect, allows you to watch DRM-protected video downloaded with BBC iPlayer and plays DRM-protected WMA audio files, too.

TwonkyVision is one of the most common NAS-installed server programs. Another option is TVersion, a powerful UPnP server you can download for free (see The source machine below). Examples of streamers that support UPnP include the D-Link DSM-510, which we've used in our walkthrough on page 157, the audio-only Roku SoundBridge M-1001 and the Linksys EVA8000.

Many people use iTunes to manage their music collections and buy music. Unless the media streamer works with the iTunes server, you won't be able to listen to purchased and protected content. The aforementioned audio-streaming Squeezebox will let you do this.

You may also see the DLNA logo on some devices. This certification scheme covers all devices designed to share media across networks. A DLNA media streamer must have certification from the Wi-Fi Alliance (for its wireless adaptor) and the UPnP Implementers Corporation. All DLNA-labelled devices should work together properly.

FILE FORMAT SUPPORT

File format support is the next issue to consider when choosing a streamer. Not all streamers

support the same list of file types. While most handle common files such as WMA, MP3 and WMV, support for others varies hugely. Pay careful attention to this list because, if you buy the wrong device, you're going to have to spend an awful lot of time reconverting files you've already painstakingly downloaded or copied.

If you've downloaded content from iTunes, for instance, you need to make sure the streamer can play AAC and H.264 files. If you've decided to burn all your home movies to DVD and want to turn those into streamable content quickly without having to convert them to another format first, you'll need to buy a streamer with support for MPEG2 or .VOB files. See our in-depth feature on video codecs on page 128 for more details.

INPUTS AND OUTPUTS

The physical inputs and outputs on the device itself can vary almost as much as the file format support. For video, an HDMI port is the ideal output. Coupled with HD capability, it ensures a high-quality picture on your HD TV and, because HDMI carries the audio signal as well, cabling is kept to a minimum.

If your TV has only one HDMI input, which is already occupied by another device, don't panic – you can still get an HD signal to your TV over a component video connection. The quality will be just as good as over HDMI, and in some cases it may be better. The only downside is that component cables are generally bulkier and you'll have to run audio separately. You'll see other outputs, such as composite, S-video and even SCART in some cases, but these are of lower quality and can't transmit HD pictures.

For audio, the type of output to watch for is digital. These come in the form of coaxial and/or optical sockets and will allow you to bypass the media streamer's usually somewhat average audio electronics. It will output sound in digital S/PDIF format ready to be decoded by your home cinema receiver.

Many media streamers also have USB sockets that allow the attachment of low-powered USB hard disks and flash drives, playing the content stored on these devices almost instantly. Don't assume you can do this simply because there's a USB socket on the back of the streamer, though. We've come across streamers that have a USB socket simply for applying firmware upgrades.

Also, you may have heard talk recently about devices known as Media Center Extenders. These are devices that work specifically with Windows Media Center PCs and offer a very similar experience – an almost identical interface and the ability to watch, record, pause and rewind live TV too. These devices are currently thin on the ground, and the Xbox 360 and aforementioned

Linksys DMA2100 and DMA2200 are the only devices we've seen.

They should become more widely available over the next year or so and, if you haven't been able to take full advantage of the Media Center ability that's included in Vista Home Premium as standard, one of these devices may well enable you to do so.

THE SOURCE MACHINE

As well as thinking about the streaming device you want, you need to think about how to 'serve' your content. For most, this will be a simple matter of using their existing main desktop PC, with its repository of videos, photos and music already in place.

However, there are other ways to serve video and music for those who don't want to leave their main machine chugging away, day and night. You can serve content from a NAS device too, with many products having UPnP media server software preinstalled. All you need do is transfer your files to the designated folders, turn on the UPnP server in the device's settings and connect to it using your media streaming device.

An old laptop with Linux and an external hard drive attached could also offer a solution, if you're prepared to do some work. Install one of the many free Linux distributions, enable Samba so the machine can be seen on the local network, add some Linux-compatible UPnP server software and you should be able to connect to it as easily as you can with a Media Player-enabled PC. A Windows Home Server can also act as a repository for your media library as it has the UPnP-compatible Windows Media Connect software built in.

If you're sticking with your desktop PC, though, it's worth bearing in mind that you don't need to feel tied to using Windows Media Player – that is, if you don't have DRM-protected media you want to watch. Install TVersion instead, which is an incredibly useful free media server for Windows. Not only does this software allow your streamer to play internet radio and display YouTube clips and internet TV stations, but TVersion will also expand the file types your media streamer is able to play.

With the right codecs installed, TVersion can 'transcode' files the streamer would otherwise not support, using your PC's horsepower to convert them on the fly. This is a neat little trick if you have collected your media from a wide range of sources and don't fancy spending time converting it.

► Streamers with the faster Draft-N technology are thin on the ground. Only Linksys has products on the market at the moment





SAFETY, SECURITY, AND THE LAW

If you've chosen to go with a wireless network, you're probably wondering how secure media streaming is. After all, you don't want the next door neighbours eavesdropping on your home movies, accessing your private photo collection or listening to your music.

Clearly security is less of a problem if you've chosen a wired network for streaming data, as the only way someone else is going to be able to access your content is to break in, drill a hole in the wall and sneakily connect a network cable to your router without you noticing.

For wireless streaming, the same principles apply as for general wireless networking. Most streamers on the market are compatible with all the usual network encryption protocols, including WEP, WPA and WPA2. Usually it's simply a case of choosing the network you want to connect to from a list, then entering the network key (see walkthrough below). Some media streamers will even allow you to use a USB drive to transfer network settings in the same way you would with a laptop or second desktop PC.

Backing up all those valuable music and video files is an important consideration. We discussed

backup in *Advanced Projects*, *Shopper 243*, but a simple way to do this would be to sign up to an online backup service such as Carbonite (www.carbonite.com), which offers unlimited backup storage for a very reasonable £25 per year.

It is important to think about the legal side of handling digital media, as your downloading, ripping and streaming activity may contravene certain laws. One obvious benefit to having a media-streaming setup is the ability to save and store all your DVD content, as well as your CD collection, centrally as digital files. Modern PCs, with their vast storage capacities, make this technically straightforward, and there are plenty of streamers on the market that allow you to stream the MPEG2 (.VOB) files found on DVD movie discs, as well as the more common compressed video formats.

Unfortunately, however, copying DVDs is an area that is more troublesome than copying CDs, simply because DVDs have anti-copy encryption. There's plenty of software out there that can crack this encryption, but doing so demonstrates an active attempt to illegally copy the content. It would be hard to argue that you did it by accident.

All forms of ripping and copying in the UK are illegal. It seems bizarre when the practice is so widespread and accepted, but the first Copyright Act, which the basic tenets of the original 1710 Act, still hold true today. The law says that every time you transfer music or video from the original disc to another medium (a 'format shift') you are committing a criminal offence.

A new law to make CD ripping legal has been proposed in the recent Gower Report into intellectual property, but has yet to make it into the statute books. The BPI has also stated that it will not sue consumers who copy CDs for personal use, such as loading the files on to an iPod. Whether or not this will apply to movies when the law is eventually changed remains to be seen.

VERDICT

Media streamers can handle anything from home movies to YouTube videos, as well as commercial audio and video. They offer a great way of centralising your content, making it more convenient to access your music and video collections, and provide a much nicer way of watching internet TV. **CS**

HOW TO... Add a streamer to your network in Vista

Once you've set up your network and bought your media streaming hardware, you'll need to get it connected. Here's how:

1 Before getting the streamer out of the box, prepare the ground. On a Vista PC, set your network to Private. This will ensure your streamer can 'discover' the media server. Fire up the Network And Sharing Center then click Start, Network, Network And Sharing Center. Choose the Customize option and select Private, making sure Media sharing is turned on too. Close the window.

2 Connect the media streamer to your TV and switch it on. In this example the DSM-510 asks whether you would like to

connect via wired or wireless LAN. Select wireless, ask it to scan for wireless networks and pick yours from the list.

3 On the next screen you need to supply the streamer with your network encryption key. If you can't remember what this is, you can find out by logging on to the internal webpage on your router. In this instance, we type 192.168.1.1 to get to the router's settings, type in the password to log in, then click to the wireless encryption page.

4 Select the encryption type from the list, which is probably WPA-PSK. Select the Network Password field and press Enter on the remote. Type in your network key on the

following screen and press OK. Press OK again and the streamer will restart.

5 You now need to allow the streamer to access your media library. Start up Windows Media Player and click the arrow below the Library to bring up the Media Sharing window. You'll see that an icon representing the media streamer has appeared in the box. Tick the box called Share my media to. Select the DSM-510 icon and click Allow. Click OK.

6 You should now be able to browse your music, video and pictures on the DSM-510. To play a video, press the orange button and then select All Videos. Choose one from the list and it will play on your TV.

